IMAGE DATA PROCESSING SYSTEM

BACKGROUND OF THE INVENTION

1.   Field of the Invention

5   The present invention relates to an image data processing system including an image inputting section for inputting image data and an image processing section for performing image processing on the input image data to create image data for printing, by which prints are prepared with the use of the image

10   data for printing in a print preparing device while the image data for printing are stored into an image storing device.

2.   Description of the Related Art

Fig. 3 shows a construction of such an image data

15   processing system according to the prior art.   An image inputting section 100 obtains image data from a negative film or a medium.   An image memory 101 temporarily stores the image data that are input from image inputting section 100. An image processing section 102 performs various images

20   processing on the input image data to create image data for printing for preparing prints.   A keyboard 103 is used for giving instructions to various sections in the system or for inputting information necessary for the image memory.   A monitor 104 displays the input image data or displays a screen necessary for

25   performing the print processing.   A hard disk 105 is one kind of

a storing medium and stores image data for printing so that a request for reprinting (process for making additional prints) on a later date can be met without the negative film. A CD-R writing device 106 is a device for writing image data into a CD-R which

5 is an external recording medium. A controlling section 107 performs operation controls over image inputting section 100, image processing section 102, hard disk 105, CD-R writing device 106, and others. Controlling section 107 is constituted with one or more CPUs and various controlling programs as a

10 core.

An image transmitting section 108 is constructed to be capable of transmitting the image data for printing, which are created in image processing section 102, to a print preparing device 109 or to hard disk 105 or CD-R writing device 106.

15 Print preparing device 109 is constituted with a mechanism for conveying a light-sensitive picture material, an exposing engine for exposing an emulsion surface of the light-sensitive picture material with images by using the received image data for printing, a developing processing section for developing the

20 exposed light-sensitive picture material, and others. Print preparing device 109 is controlled by a controlling section 110. Image data for printing refer to data having a form that can be used as they are in the aforesaid exposing engine. The exposing engine may be, for example, a laser engine, a PLZT

25 engine, a CRT engine, or the like.

Contents of the image processing performed in image processing section 102 may be varied. For example, they may include image processing based on correction values that are input from keyboard 103 for correcting the color and density,

5 image processing (conversion process) for enlarging or diminishing the size in order to meet the requested print size, γ-correction of the light source of the exposing engine, and the like. In any way, image transmitting section 108 is constructed to be capable of transmitting image data for

10 printing having a size that meets the requested size of the prints to be prepared.

The aforementioned construction according to the prior art gives rise to the following problems. Namely, there is a problem in that, when one wishes to perform a process of

15 preparing prints in print preparing device 109 on the basis of the input image data and a process of storing or writing into hard disk 105 or CD-R on the basis of the image data in parallel, the print preparation efficiency (for example, as represented by the number of printed sheets prepared per one hour) decreases.

20 Particularly, in the case of storing the image data after performing a process such as enlarging or diminishing the size instead of storing the image data for printing transmitted to print preparing device 109, as they are, into hard disk 105, the process is carried out in image processing section 102, so that

25 the load imposed on image processing section 102 increases,

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and the amount of data transmitted from image transmitting section 108 falls. This also applies to the case of writing the image data into CD-R writing device 106. Since controlling section 107 performs controls over image inputting section 100,

5 hard disk 105, CD-R writing device 106, and others, the image data cannot be input from image inputting section 100 or else the inputting efficiency decreases while the image data are being stored or written. If the image data cannot be input efficiently, the speed of image processing or image transmission

10 in a later step also decreases and, as a result, the print preparation efficiency also inevitably decreases.

The present invention has been made in order to solve the aforementioned problems of the prior art and an object thereof is to provide an image data processing system that can prevent

15 decrease in the efficiency of preparing prints when one wishes to store or write image data into a storing medium in parallel with the process of preparing the prints.

SUMMARY OF THE INVENTION

20 In order to solve the aforementioned problems, the image data processing system according to the present invention comprises

an image inputting section for inputting image data;

an image processing section that performs image

25 processing on the input image data to create image data for

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printing;

     a first controlling section that performs controls over said image inputting section and said image processing section; and

     an image transmitting section capable of simultaneously

5   transmitting said image data for printing to a print preparing device and to an image storing device, characterized in that said image storing device includes an image receiving section that receives said image data for printing that are transmitted from said image transmitting section; a storing medium for

10 storing the received image data; and

     a second controlling section that performs controls over said image receiving section and said storing medium.

     The image data processing system according to this construction provides the following functions and effects. The

15 image processing section performs image processing on the input image data and creates (prepares) image data for printing. The first controlling section performs controls over the image inputting section and the image processing section. With respect to the created image data for printing, the system is

20 constructed in such a manner that the same data can be simultaneously transmitted both to the print preparing device and the image storing device via the image transmitting section. The image storing device includes the image receiving section (buffer substrate or the like) for receiving the image data for

25 printing transmitted from the image transmitting section and

the storing medium (hard disk or the like) for storing the received image data. These are controlled by the second controlling section. In other words, the process of storing the image data into the storing medium can be carried out by the

5   second controlling section which is independent from the first controlling section. Therefore, subsequent processes on the image data for printing transmitted to the image storing device side are carried out under the instructions from the second controlling section of the image storing device. In other words,

10   the process of storing the image data into the storing medium can be carried out separately from the image processing in the image processing section and the inputting process in the image inputting section (without affecting these). For example, in addition to storing the received image data for printing as they

15   are, the image data can be stored after being subjected to some processing. As a result, an image data processing system can be provided in which the efficiency of preparing prints does not fall when the image data are stored into the storing medium in parallel with the process of preparing the prints.

20   A preferable mode of carrying out the invention is one in which the system further includes an external recording section for recording the received image data into an external recording medium, and the external recording section also is controlled by said second controlling section.

25   For example, in the case of recording the image data into

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an external recording medium such as a CD-R, the control over the external recording section (for example, a CD-R driving device) also is carried out by the second controlling section. Therefore, even if the process of writing the image data into the

5   external recording medium is carried out in parallel with the print preparing process, the efficiency of preparing the prints does not fall down.

Another preferable mode of carrying out the invention is one in which the system further includes conversion processing

10   sections that perform a conversion process on said received image data, and is constructed so that the image data subjected to the conversion process are stored into said storing medium and/or said external recording medium.

There are cases in which the image data for printing are

15   stored after being subjected to a conversion process instead of being stored into a storing medium or an external recording medium as they are. For example, one may perform a process of enlarging or diminishing the size of the images. If this conversion process is carried out under the instructions from

20   the first controlling section, the print preparation efficiency falls down. However, if the conversion process is carried out under the instructions from the second controlling section, the conversion process can be carried out and the image data can be stored without decreasing the print preparation efficiency.

25   Still another preferable mode of carrying out the invention

is one in which the system further includes a first conversion processing section that performs a conversion process on the image data for printing that are constructed in said image processing section;

5   a second conversion processing section that performs a conversion process on the image data for printing that are constructed in said image receiving section; and

conversion process selecting means for selecting either one of said first conversion processing section and said second

10   conversion processing section.

When the aforesaid conversion processing section for performing the process of enlarging or diminishing the image size is to be provided, the conversion processing section can be provided both in the image processing section which is under

15   control of the first controlling section and in the image receiving section which is under control of the second controlling section.   Then, conversion process selecting means can select either one of the two.   For example, in accordance with the required capability (efficiency) of preparing prints, an

20   operator can select which of the two conversion processes is to be carried out.   Else, by allowing the first conversion processing section and the second conversion processing section to perform different processes, the operator can select a process in accordance with the capability.

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BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a conceptual view illustrating an overall construction of an image data processing system.

Fig. 2 is a flow chart of a representative processing
5   procedure.

Fig. 3 is a view illustrating an overall construction of an image data processing system according to the prior art.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

10   A preferable embodiment of the image data processing system according to the present invention will be described with reference to the attached drawings.   Fig. 1 is a conceptual view illustrating an overall construction of the system.   This image data processing system is a system for inputting image
15   data and for preparing picture prints with the use of the image data as well as storing the image data.

<System construction>

Functionally, the system can be roughly divided into
20   image processor A, image storing device B, and printer processor (print preparing device) C.   First, image processor A will be described.   Image processor A has a function of obtaining image data for preparing prints and performing image processing.   Image inputting section 1 is provided for inputting
25   and obtaining image data from an image forming medium.   In

the case of reading framed images from a picture film such as a negative film F, an exclusive-use scanner for films is used. Further, one can obtain image data also from various media M (MO disk, flexible disk, storing medium for digital cameras, and

5   others) in which digital images are recorded. The obtained image data are temporarily sent and stored into image memory 2.

Image processing section 3 has a function of performing various images processing for creating image data for printing

10   that are used for preparing prints. The image processing function can be realized by a suitable combination of hardware and software. First controlling section 4 has a function of performing operation control within image processor A. First controlling section 4 is constructed with one or more CPUs, a

15   controlling program, and others as a core. Keyboard 5 is used for giving instructions to various sections in the system and for inputting and setting various data. Monitor 6 is used for confirming the progress of the print process and for displaying the obtained image data to determine the color and density, or

20   the like. Setting section 7 is provided for setting a mode of the print process and for setting the mode or the like of storing the image data, and is based on the function of software.

Image processing carried out in image processing section 3 may be, for example, as follows. Image data of framed images

25   are read out from a developed negative film F and displayed on

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monitor 6. While looking at the displayed screen, an operator determines whether prints can be made with suitable color and density, and inputs correction values of color and density from keyboard 5 in accordance with the needs. Based on these

5   correction values, the image data are corrected. Further, when picture prints are to be prepared, the image data must have a size that meets the print size. For this purpose, the obtained image data are subjected to an enlarging or diminishing process. This is carried out as a function of the first conversion

10   processing section 3a in image processing section 3. Further, one can carry out an enlarging or diminishing process into a standard size such as 4BASE or 16BASE (1BASE = 512 x 768 pixels). Furthermore, one can carry out a compression process such as JPEG. Image data for printing prepared in image

15   processing section 3 are transmitted from image transmitting section 8.

Printer processor C includes exposing engine 10, developing processing section 11, and drying processing section 12. Each section in printer processor C is controlled by

20   controlling section 13. When the image data for printing are received from image transmitting section 8, exposing engine 10 exposes an emulsion surface of a light-sensitive picture material with images by making use of the image data. Exposing engine 10 to be used may be of a suitable type such as laser engine,

25   PLZT engine, or CRT engine. Developing processing section 11

performs a developing process on the light-sensitive picture material exposed and printed with images. Drying processing section 12 performs a drying process on the developed light-sensitive picture material. Finished picture prints are

5   discharged from a print discharging section. Image processing section 3 prepares image data for printing that can be used, as they are, in exposing engine 10.

Next, image storing device B will be described. Image storing device B is used mainly for storing and managing the

10   image data. Image storing device B can be constructed, for example, with a general personal computer. Therefore, image storing device B may include additional functions other than the storage and management of images.

Buffer substrate 20 functions as an image receiving

15   section, and can receive image data (image data for printing) that are transmitted from image transmitting section 8. Buffer substrate 20 includes buffer memory 20a, and temporarily stores the received image data. Buffer memory 20a may have a storing capacity for several sheets of images. Second

20   conversion processing section 20b has a function of performing a conversion process on the received image data. This function is similar to the one in the first conversion processing section 3a of image processing section 3. Second conversion processing section 20b is constructed with hardware so that the

25   processing speed may increase. Main memory 21

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(corresponding to the main storing device of a personal computer) receives the image data from buffer memory 20a. Here, the received image data for printing can be stored or written, as they are, into hard disk 22 or CD-R without being

5   subjected to the process of second conversion processing section 20b.

The image data developed in main memory 21 are sent to hard disk 22 (corresponding to the storing medium) and/or to the CD-R (external recording medium) of CD-R writing device 23

10 (corresponding to the external recording section). A photograph shop that has received a request for preparing picture prints from a customer not only prepares picture prints by using the obtained image data but also stores the image data into hard disk 22. This is to use the stored image data when a

15 request for a process of making additional prints (reprinting) is received from the customer at a later date. By storing the image data in hard disk 22, the customer can request for reprinting without bringing the negative film or the like to the photograph shop. Further, there is no need to scan the

20 negative film again, so that the operation efficiency of the reprinting process will be enhanced.

Furthermore, a customer may request for a process of writing the image data into a CD-R in addition to preparation of picture prints. In this case also, the image data are written

25 with the use of image storing device B. A CD-R is given as an

example of the external recording medium; however, it is not limited to this alone, so that the image data may be written into other external recording media such as a DVD.

5 The second controlling section 24 performs controls over various sections of image storing device B. The second controlling section 24 is constituted with a CPU, image managing software (corresponding to the image managing section), and others as a core. This image managing software has a function of storing the received image data into hard disk

10 22 to form a database. The image data are managed and stored order by order. An image ID (corresponding to a frame number) and an order ID are given to the stored image data. When making reprints, one can search into the database with the use of these IDs as a key, so as to extract the image data that are to

15 be reprinted. Monitor 25 and keyboard 26 are connected to the second controlling section 24.

In setting section 7 of image processor A, a mode of processing the image data can be set. For example, one can set a mode for simultaneously performing "preparation of picture

20 prints + storage into hard disk + writing into CD-R", a mode for simultaneously performing "preparation of picture prints + storage into hard disk", or a mode for simultaneously performing "preparation of picture prints + writing into CD-R". Further, when the preparation of picture prints is not to be

25 carried out, one can select a mode for performing storage into

hard disk and/or writing into CD-R. At ordinary times, the image data are stored at least into the hard disk. These are based on the function of process mode selecting means 7b of setting section 7.

5   Further, as a function of setting section 7, one can set whether the process of converting the image data are to be carried out in the first conversion processing section 3a or in the second conversion processing section 20b. One can select either one of the two conversion processing sections in

10   accordance with the needed picture print preparation capability. This is based on the function of conversion process selecting means 7a of setting section 7. Further, for example, for a user that wishes to write the image data obtained by scanning a negative film into CD-R without performing any process, a mode

15   is provided by which the image data obtained in image inputting section 1 can be transmitted, as they are, to the image storing device B side. This mode also can be selected by the function of process mode selecting means 7b.

        In addition, in the case of storing or writing the image

20   data in an image compression mode such as JPEG, one can select its compression ratio. This is based on the function of compression ratio selecting means 7c of setting section 7. At ordinary times, it is preferable to set the numerical value of the compression ratio to be high (for example, about 90%). The

25   compression method is not limited to JPEG alone, so that other

compression methods may be employed.

<System function>

     Next, a representative processing procedure according to
the image data processing system of Fig. 1 will be described
with reference to the flowchart of Fig. 2. First, as a processing
mode, one selects a mode for simultaneously performing
"preparation of picture prints + storage into hard disk + writing
into CD-R" in parallel. Further, the process of converting the
image data is set to be carried out on the image storing device
side.

     First, a developed negative film F is set into a scanner,
which is the image inputting section 1, so as to carry out
scanning (#1). The image data of the read negative film are
stored into image memory 2 (#2). When the image data for one
order (corresponding to one roll of negative film) are obtained,
the images are displayed on monitor 6. While looking at the
images displayed on monitor 6, an operator determines the
color and density, and inputs correction values of the color and
density in accordance with the needs.

     Image processing section 3 performs image processing on
the obtained image data on the basis of the input correction
values (#3). Further, image processing section 3 performs other
image processing (color management process, γ-correction of
the light source, and the like), and also performs a process of

enlarging or diminishing the size in order to meet the print size. The above-described procedure completes the preparation of image data for printing.

Image transmitting section 8 transmits the image data for
5   printing prepared by image processing section 3, simultaneously to the printer processor C side and to the image storing device B side (#4).   Since the image data to be sent to both sides are the same, the image data can be simultaneously transmitted. After the image data for printing are transmitted, controls over
10   various sections in image storing device B are carried out not by the first controlling section 4 but by the second controlling section 24.   Further, the control over printer processor C also is carried out by controlling section 13.   Therefore, the processes in image inputting section 1 and in image processing
15   section 3 are not delayed by the process of storing or writing the image data carried out by image storing device B. Therefore, the image data for printing can be transmitted to printer processor C without interruptions, thereby preventing decrease in the print preparation efficiency.   The system is
20   constructed in such a manner that, basically, the image processor A side is not involved in the processes subsequent to transmission of the image data for printing from image transmitting section 8 to the image storing device B side.   For this reason, the overall processing efficiency of the system is
25   prevented from falling down even if the print preparing process

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and the image storing/writing process are carried out simultaneously.

In printer processor C, when the image data for printing are received, an exposing process is carried out by exposing engine 10 (#5). Namely, a light-sensitive picture material is exposed and printed with images on the basis of the image data for printing. Subsequently, a developing process and a drying process are carried out on the light-sensitive picture material so as to prepare picture prints (#6, 7, 8).

On the other hand, the image data for printing transmitted from image transmitting section 8 are received by buffer substrate 20. The image data for printing are temporarily developed into buffer memory 20a provided in buffer substrate 20. Here, if it is set that a conversion process is to be carried out, the process of converting the image data for printing (compression by JPEG, process of enlarging or diminishing the size, and others) is carried out in the second conversion processing section 20b (#10). If the conversion process is not to be carried out, the process of step #10 is not executed. Next, by the function of the image managing software, the image data developed in buffer memory 20a are read out and developed into main memory 21 (#11). Subsequently, the image data in main memory 21 are stored into hard disk 22 and also sent to CD-R writing device 23 to be written into a CD-R (#12, #13).

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According to this processing procedure, it is set that the conversion process is carried out on buffer substrate 20, thereby preventing decrease in the print preparation efficiency. In Fig. 3 of the prior art, the conversion process which is carried out

5 on buffer substrate 20 must be carried out in image processing section 102, so that the print preparation efficiency inevitably falls down. It is preferable if the second conversion processing section 20b is constructed in particular with hardware, because the process can be executed at a high speed.

10 According to the system construction of Fig. 1, storage into hard disk 22 and writing into CD-R writing device 23 can be carried out while a negative film is being scanned in image inputting section 1. Due to this reason also, the processing speed is raised. According to the prior-art system, it is difficult

15 to carry out these processes at the same time.

In the flowchart of Fig. 2, a construction has been described in which the same image data for printing are simultaneously transmitted from image transmitting section 8. If different image data are to be transmitted to the two,

20 simultaneous transmission is not possible, so that the image data must be transmitted at different timings. For example, if the image data subjected to the conversion process by the first conversion processing section 3a of image processing section 3 are to be transmitted to image storing device B, the image data

25 to be transmitted to printer processor C are different from the

image data to be transmitted to image storing device B, so that they are transmitted at different timings. In this case also, the efficiency is good as compared with the prior-art system of Fig. 3, though the processing efficiency falls down as compared with 5 the case of simultaneous transmission.

<Other embodiments>
(1) When the image data are transmitted from image transmitting section 8 to image storing device B, the 10 connection is established, for example, by an exclusive-use line; however, the connection method is not limited to this alone. Image processor A and image storing device B may be connected by a general-use network. Further, in this case, the number of apparatus to be connected is not limited to specific numbers.

15 (2) If image storing device B is constructed with a general personal computer, image storing device B can be connected to a network such as the internet. This allows that a customer can request, via the internet, a reprinting process using the image data stored in hard disk 22.

20 (3) The print preparing device may be an ink jet or thermal sublimation type printer other than printer processor C.